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The Effects of Motor Ability Grouping in Physical Education on the Improvement of Physical Fitness and Certain Game Skills

James D. Black
Central Washington University

THE EFFECTS OF MOTOR ABILITY GROUPING IN PHYSICAL EDUCATION ON THE IMPROVEMENT OF PHYSICAL FITNESS AND CERTAIN GAME SKILLS

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by

James D. Black

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APPROVED FOR THE GRADUATE FACULTY

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Everett A. Irish, COMMITTEE CHAIRMAN

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Albert H. Poffenroth

_____

Dohn A. Miller

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CHAPTER I

THE PROBLEM AND DEFINITION OF TERMS USED

This study was undertaken in an attempt to determine if grouping in physical education is actually effective. Most physical educators agree that grouping is desirable, but very few have actually grouped other than by grade and sex. This has resulted in classes with wide ranges of age, body size, and ability. Thus, from the standpoint of the instructor the classes are difficult to teach and from that of the students, difficult in which to learn.

I. PROBLEM

Statement of the Problem

It was the purpose of this study to evaluate the effects of motor ability grouping in physical education on the improvement of physical fitness and certain game skills. The subjects were boys in the eighth and ninth grades at Baker Junior High School in Tacoma, Washington.

Importance of the Study

The rate and amount of improvement of the individual students is one of the best criteria a physical educator

can use to evaluate his success as a teacher. A truly professional person will be constantly searching for new and better methods of teaching, evaluating and grouping in physical education classes.

Educators have experimented with grouping in physical education. Students have been grouped by: grade, sex, health, physical fitness, multiples of age-height-weight, ability, physical capacity, motor ability, interests, educational ability, speed, skill, and previous experience. There is no set standard procedure for grouping; in fact, most schools use no grouping at all.

Homogeneous grouping has several advantages. Grouping individuals with similar capacities and characteristics in the same class makes it possible to better meet the needs of each student and aids in equalizing competition. Instruction can be better organized and adapted to the level of the student. Grouping may enable each child to experience a chance to excel, show leadership ability, and gain recognition.

Grouping in physical education may be advantageous to the student, but does grouping increase the rate of improvement of physical fitness and certain game skills more than a regular non-grouped class? Also, does the improvement rate warrant the extra time and effort involved in the actual grouping procedure itself?

Limitations of the Study

The following appear to be limitations of the study:

1. Tests used for measuring physical fitness and skill level have various degrees of objectivity, reliability, and validity.
2. The test will be administered at different times of the day. This could affect performance levels.
3. A small percentage of the subjects that were placed in the three groups would not be included in the final results. The reasons were:
   a. Change in physical education classes
   b. Transfer to another school
   c. Prolonged illness or injury
4. There is no way to scientifically control the opportunities of progression presented to each class. The investigator, however, has attempted to utilize the best teaching methods in each group and to keep the physical environment for each group the same in order to insure consistency.
5. The chinning or pull-up test will be used in

the Washington State Fitness Test and also in the McCloy Motor Ability Test used to group the students.

II. DEFINITION OF TERMS

Motor Ability

The ability of an individual to perform in a variety of sports activities.

Homogeneous Grouping

The grouping of individuals by means of a common characteristic, such as motor ability.

Game Skills

Skills will be tested in the following areas:

1. Touch Football
2. Basketball
3. Volleyball
4. Track and Field

Classification Index

This term will apply to C. h. McCloy's Classification Index: CI = 20 (age in years) 6 (height in inches) weight (pounds).

Physical Fitness

The development and maintenance of a sound physique and of soundly functioning organs, to the end that the individual realizes his capacity for physical activity, unhampered by physical drains or by a body lacking in physical strength and vitality (7:16).

High Ability Group

Subjects who score in the upper 50 per cent of the total group on the motor ability test.

Low Ability Group

Subjects who score in the lower 50 per cent of the total group on the motor ability test.

Control Group

A typical physical education class, containing students of all ranges of motor ability.

III. ORGANIZATION OF THE REMAINDER OF THE STUDY

1. Chapter II will contain a review of related literature.
2. Chapter III will contain the procedure used in forming the three groups, and also the procedure used in testing these groups.
3. Chapter IV will contain an analysis of the data and the statistical results.

4. Chapter V will contain the summary, conclusions, and recommendations for further study.

CHAPTER II

REVIEW OF THE LITERATURE

The system of classifying students into homogeneous groups via scientific measurement seems to have had its beginnings in a large way in the schools of Detroit, Michigan, under the guidance of Dr. Charles S. Berry in 1920. During that year, 10,000 Detroit first graders were divided into three groups--X, Y, and Z-- on the basis of a group intelligence test. The upper 20 per cent were Group X, the lower 20 per cent group Z and the middle "average" 60 per cent were the Y group. Curriculums were then established aimed at presenting the best school experiences with regard to the range of interest and ability. Their system has been followed to a large degree since (22:37-38).

It is an accepted fact that grouping is important to learning; it is also a fact that the popularity of grouping rises and declines through the years. Bent and McCann noted that at the present time homogeneous grouping on the basis of learning ability is on the upsweep and has been since the first man-launched satellite was successfully put into orbit and the progress of Russian education brought to the fore (4:262).

Although much has been written on the subject, too little has actually been done in certain fields; this is most noticable in the field of physical education.

Grouping in academic subjects is the rule rather than the exception in the placement of students in classes, quite the reverse is true in physical education--here ability grouping is the exception.

All too often indiscriminate placement--placement of convenience to either the student's class schedule or to the schedule of the administrator--prevails. It necessarily follows that the classes are heterogeneous; McGee and Barrow stated,"... the student's abilities vary from the lowest to the highest and a similar situation exists with respect to student size and experience.." (3:419). The primary objective of ability grouping is to bring together individuals with like abilities in an enriching environment in which they can work and progress to their fullest capacity (29:21).

It is the teacher's responsiblity to be constantly searching for better and more feasible methods of classification with regard to individual needs, differences, interests, and capacities, and to keep in mind, as Willgoose said, "The look of education is to differentiate between the fit and the partially fit in

all areas of the educational program" (32:366).

There are, of course, many and varied reasons for considering homogeneous grouping. Some of these were listed by Cowell and Schwehn:

1. It assists the teaching process and makes for more effective learning.
2. The activities are more easily adjusted to the ability and performance levels of the pupil.
3. The skilled pupils are not held back and move on to an advanced level, while the less skilled are happier in not being discouraged by the obvious differences between themselves and the more skilled students.
4. It serves as the only method of eventually equalizing skill-levels so that the ultimate objective of bringing together all pupils may be achieved.
5. It is the most efficient method of satisfying the needs and interests of individual pupils.
6. It makes for fairness in grading and keeps motivation at a higher level because there is less discouragement (10:323).

Hughes and French concluded that the teacher should always keep in mind that, "..if learning is to be good--in fact, if there is to be learning at all--- then the learner must feel adequate and secure" (13:78). This is just as true, said Miller, in the pool, in the gymnasium, and on the athletic field as in the classroom (21:402).

A physical educator cannot just suddenly decide that because homogeneous grouping is the rage he is going to reorganize his classes some way the next day. While the idea to regroup may be sound, there are many factors to keep in mind prior to and during the process--the first of which come to the fore when choosing the classifying device:

1. Exactly what is the purpose of the physical education experience?
2. Why is classification needed?
3. What is the size and the nature of the group?
4. What equipment and facilities are available?
5. How much time will be required to administer the necessary tests, and indeed, which tests will be used (3:421) ?

The factors which have been used to group students range from age, sex, grade, intelligence, ability, and/or age-height-weight to race, religion, role performance (leader, follower) and/or convenience of scheduling. Bookwalter pointed out that the criteria used to classify students in academic courses are usually grade and aptitude; but the physical educator must provide for differences in not only grade level and intellegence, but also strength, endurance, physique, sex, health, size, coordination, and special sports skills--always keeping in mind that safety, health, physical

development and maturation are all integral parts of the education program (5:64).

Willgoose noted that one of the oldest and most popular ways of classifying students in physical education classes is the age-height-weight method which stems from the fact that as children grow older they usually gain in height and weight which is usually accompanied by increased power, strength, and motor coordination (32:331).

The investigator did not classify according to this method, rather a motor ability grouping test was administered. Howard and Masonbrink listed the following three advantages of motor ability grouping:

1. It is a more general measure--a broader test--which may be administered to each individual prior to his entrance into class activities.
2. It supplies adequate information from which to assign basic groups.
3. If additional groups within a class are deemed necessary, tests of achievement in a designated game or sport may then be given (12:153).

There are, as with all tests, disadvantages to using a motor ability test as a classification index. Howard and French felt that those who score in the upper quartile profit more from this classification than those scoring in the lower quartile. Also, that the low

ability students miss the stimulation of playing with the more highly skilled, and may feel that there is a social stigma attached to their group (13:76).

Willgoose stated:

> As a rule the chief purpose behind the classification of school children is to equate boys and girls according to their respective abilities and to facilitate efficient teaching (32:330).

The instructor must be aware that no single method will suffice for a permanent classification scheme and that there are always exceptions to the rule--occasionally there will be a student who just does not belong in the category in which the classification device placed him. According to McGee and Barrow:

> These exceptions will stem from many factors including student motivation, educability, past experiences, age level, determination, interest, native ability, and hard work. In the final analysis the instructor used his judgement and makes the necessary adjustment by moving the exception to the rule up or down in the grouping as the situation may dictate (3:432).

The known facts as to how pupils learn lead to the conclusion that the more homogeneous the group the better one teacher can handle the situation. Knapp and Harmon concluded, "The extent to which a group is homogeneous in the focal point of the learning experience, the better the results that are likely to occur" (16:144).

Many of the arguments favoring ability grouping were

listed by Ernest W. Tiegs:

1. Students work better and accomplish more
2. Students are more social minded and happier
3. Students adjust better
4. Superior students profit because of keener competition within the group
5. Inferior students are less frustrated and defeated as when classified at random
6. More students succeed at more things
7. The enthusiasm and effectiveness of the teacher are increased
8. Ability grouping is inevitable outside of school; grouping in school is simply taking advantage of a natural law (28:262).

Then, the argument that there is a reduction in the "incidence and severity of accidents" was brought forth by Bookwalter (5:64).

Likewise, some who do not favor ability grouping have noted their arguments against it; Douglas E. Lawson said that:

1. Grouping is undemocratic
2. Grouping results in the development of such undesirable personality traits as inferiorities and superiorities.
3. A co-operative class spirit cannot be developed
4. There is no inspiration for the duller students and the bright children overwork
5. Grouping assumes that individuals do not change

6. Grouping fosters undesirable competition and selfishness

7. Grouping hampers the social progress of the student

8. Parents do not want ability grouping (17:104).

Knapp and Hagman maintained that, "It must be recognized that in almost all schools arrangement of classes on such basis (i.e., ability grouping via measurement) presents serious administrative difficulty" (16:330).

On the whole, student feelings toward ability grouping tend to be favorable. This was pointed up markedly from the answers taken from a questionnaire administered by Lockhart and Mott to 400 freshman girls at the University of Nebraska. Ninety-eight per cent of the superior group preferred segregation because of keener competition, more class enthusiasm, and more interesting and advanced work. Likewise, 88 per cent of the lesser skilled group commented favorably saying that they were less self-conscious, and that there was more time for individual help and practice. Out of the lower group, 6 per cent felt that the presence of skilled performers would have motivated them (19:61).

It seems that the values to be gained from ability grouping in physical education are more individual

instruction, equalization of teams for competition, and higher levels of pupil performance. Lockhart and Mott further noted that:

> Recognition of the desirability of ability grouping in physical education is indicated by the large number of proposed tests of motor ability and educability and by efforts to propose practical classification and sectioning devices (19:58).

Then Ethel L. Cornell stated:

> The results of ability grouping seem to depend less upon the fact of grouping itself than upon the philosophy behind the grouping, the accuracy with which groupings is made for the purposes intended, the differentiations in content, method, and speed, and the technique of the teacher, as well as upon more general environmental influences (9:289).

It is unfortunate that the classification of pupils via any one variable cannot solve all their learning problems.

As far as recommendations are concerned, Douglas E. Lawson listed several which said, in essence, that the teacher should be involved in the plans for grouping and should be encouraged to regroup or sub-divide within his own class; special classes should be provided for both the high and low ability groups with the smaller groups being those of slower learners; ability grouping should be handled so as to avoid embarrassment to pupils and/or parents, and the grouping should not be fixed and rigid--if ability should warrant, a pupil

should be shifted from one group to another. Then, first and foremost:

> Teachers should be taught to understand that the purpose of ability grouping is to make possible better provision for the individual differences and needs of pupils (17:103-104).

CHAPTER III

PROCEDURES

The purpose of this study was to evaluate the effects of motor ability grouping in physical education on the improvement of physical fitness and certain game skills. The study involved three physical education classes of eighth and ninth graders at Baker Junior High School, Tacoma, Washington, during the 1965-66 school year. Classes were daily and 56 minutes in length.

I. PROCEDURES OF GROUPING

At Baker Junior High School, there were two men physical education teachers. During the second, third, and fourth periods approximately sixty boys reported to the gymnasium each period for physical education and were to be separated into two classes per period. The McCloy Motor Ability Test was administered to the second and third period classes, and the students were grouped according to their test results.

The investigator taught the high ability group (upper 50 per cent) during the second period and the low ability group (lower 50 per cent) third period. The fourth period the investigator taught the control group. This was a typical physical education class

which contained students of all ranges of motor ability who had been selected at random.

McCloy's Motor Ability Test

In the development of the McCloy General Motor Ability tests, results on individual test elements were correlated with the total score on a large battery of achievement tests. The elements finally selected to form the test gave us as high a prediction of general motor ability as was given by any other combination of events. Other items added to this battery gave no significant additional predictive value.

McCloy correlated total track and field points with the technical skill of physical education students in soccer, basketball, volleyball, and softball, as determined by students' ratings. The resulting correlations were: Soccer - 84, Basketball - 92, Volleyball - 88, Softball - 78 (20:208).

McCloy's Motor Ability test was designed to measure the "developed capacity" of an individual for participation in a wide range of physical activities. It is composed of a simple test of strength and four track and field events. The strength test was the chinning test computed to arm strength, using McCloy's formula:

Chinning Strength = 1.77 (weight) - 3.42 (chins) - 46.

The track and field tests may vary according to the age and experience of the group. The test is comprised of a 50 or 100 yard dash, running or standing broad jump, running high jump, and shot-put or basketball throw for distance or softball throw for distance. The investigator chose the following tests:

1. 50 yard dash
2. Standing broad jump
3. Running high jump
4. Softball throw

The scores from the track and field tests were changed from raw scores to point scores using McCloy's universal scoring tables (Appendix, Table XVI). After all events were finished, the following formula was used:

General Motor Ability Score = .1022 (track and field) + .3928 (chinning strength)

The scores were the criteria used for dividing the total group of boys into the high and low experimental groups.

II. INSTRUMENTS OF MEASUREMENT

Washington State Physical Fitness Test for Junior-Senior High School Boys

The Washington State Physical Fitness Test for Junior-Senior High School Boys was selected because the investigator felt that since the boys being tested were from Tacoma, Washington, the norms established by boys from the State of Washington were more reliable and valid than those taken elsewhere.

This test was developed by a committee, Mr. Jack Leighton, chairman, organized by the Washington Association for Health, Physical Education and Recreation. The test battery was designed to measure strength, agility, endurance and flexibility. Separate test batteries for secondary boys were then established by which these components could be evaluated (27:3).

In the Fall of 1958 these tests were sent throughout the state and the results were forwarded to Eastern Washington College of Education at Cheney where the material was evaluated, state norms established and test administration explanations clarified (27:3).

In 1962, the norms were re-evaluated and a more rigid set of physical fitness standards were developed. The equipment necessary for administering this test included a set of dip bars; one chinning bar; one

blackboard; one eraser; one piece of chalk; one yard-stick; one small ladder or chair; scores sheets; one stop watch. The tests described below can be found in the examiner's manual (27:7-13).

Chins. The purpose of this test was to measure the strength of arms and shoulder muscles. The subject jumps and grasps the bar. He bends his elbows and pulls himself up until his chin is above the bar. He then lowers himself to a hand position with the arms completely straight at the elbows. This constitutes one chin. He then repeats the movement for as many times as possible. The score was the number of complete chins that could be performed correctly and consecutively.

Dips. The purpose of this test was to measure the strength of the arms and shoulder muscles. The subject jumps or is assisted to an arm support position on the dip of parallel bars. He then lowers himself between the bars until the angle of the arm at the elbow joint is equal to or less than a right angle. The subject then pushes up to extended arm support position. This constitutes one dip. He repeats this dipping movement for as many times as possible. The score was the number of complete dips that could be performed correctly and consecutively.

Jump-reach. The purpose of this test was to measure leg strength. The subject stands facing the wall and as close to it as possible keeping the feet together and flat on the floor. He then reaches upward with both hands as far as possible. A chalk mark is made at the maximum reach at the tip of the fingers for each hand. A line is drawn between these two points. The subject then stands with either side to the wall. Chalk dust is placed on middle finger of the hand nearest wall. The subject then bends the knees and ankles, assuming a semi-crouch position with the arms swung backward. Then, swinging the arms forward and upward and extending the legs and ankles, as in a basketball center jump, he jumps as high as possible touching the board at the maximum height of jump. The test was administered three times--the best mark of the three being recorded. This was the measured distance between the first chalk mark and the highest mark made on the jump.

Squat-thrust. (10 seconds) The purpose of this test was to measure agility. This is a four-part exercise. At the start, the subject stands erect, with feet close together and hands at sides. In part one, the subject moves to a squat position with hands on the floor just outside of the feet, and arms straight.

In part two, he moves to a front-leaning rest position, i.e., feet are extended backward so that the body and legs form one line being supported on hands and feet. In part three, he returns to the squat position described under part one, and in part four returns to an erect standing position. This constitutes one complete and fractional squat-thrust movements performed in a ten-second period.

Squat-thrust. (One minute) The purpose of this test was to measure endurance. This is the same test described previously as an agility test. It differs from the former only in that it is administered for a period of one full minute. The test was scored in the same manner as the previous test. However, in addition the following computations are required to give a measure of the subject's endurance:

1. Multiply the number of squat-thrust movements performed in ten seconds (agility score) by six. This figure will indicate the possible number of squat-thrust movements the subject should be able to perform in the period of one minute.

2. Subtract the number of squat-thrust movements the subject actually performed for the one minute period from the above figure.
3. The result will indicate the drop-off in squat-thrust movements.
4. The point score obtained for the number of movements performed during the one minute period plus the point score for the drop-off gives the score for endurance.

Floor touch. The purpose of this test was to measure flexibility. The subject stands erect with his feet together and his knees locked, keeping both legs straight. He then bends forward from the hips and places his finger tips on the floor immediately in front of his toes. He must hold this position for three full seconds. This is a pass or fail test.

Fingers-behind-back-touch-right. The purpose of this test was to measure flexibility. The subject stands erect and places his right hand over his right shoulder extending the fingers of his right hand down his back, palm of hand toward his body. He places the back of his left hand in the small of his back and moves it upward until the fingers of right and left hands are touching. He must hold this position for three full seconds. This test is a pass or fail test.

Fingers-behind-back-touch-left. The purpose of this test was to measure flexibility. The movement is the same as for the fingers-behind-back-touch-right except the position of the hands is reversed. Otherwise, the administrative and scoring procedures are the same.

Borleske Touch-Football Test

The Borleske Touch-Football Test was designed to measure ability to play touch football. In constructing the test, Borleske experimented with eighteen individual objective tests, and obtained a validity coefficient of .85 with the opinion of experts. The battery of five tests selected has a correlation of .93 with a larger battery of which the five tests were a part. A short battery of three tests correlated .88 with the criterion (11:73).

The equipment necessary for administering this test included six footballs; six markers; one stop watch. The investigator chose the short battery of touch-football test because it simplified the test considerably and reduces the amount of time required for its administration. The short battery consists of: a forward pass for distance, punt for distance, and running straightaway, speed, or sprint.

Forward pass for distance. The field was marked with lines every five yards and with markers every ten yards. Each throw had to be preceded by the catch of a pass from a

center, and three throws were allowed. The score was the number of yards thrown on the best throw.

Punt for distance. The punt for distance was executed in much the same way as the forward pass for distance, except the ball was punted instead of thrown. The score was the number of yards the ball was punted in the air.

Running-straightaway, speed, or sprint. The subject starts on the snap of the ball from a point five yards back of center and catches the ball and runs as fast as possible for fifty yards. The score was the time (to the tenth of a second) from the center snap until the subject crossed the finish line.

Stroup Basketball Test

The Stroup Basketball Test was designed to measure the ability to play basketball. In constructing the test, Stroup used the scores made by competing teams as a criterion for validating his basketball skill tests. Stroup found that of 41 ten-minute games, the team with the highest skill score average won 84 per cent of the time (26:353). The equipment necessary for administering this test included seven basketballs, fourteen bottles, one stop watch, three baskets. The

test items are:

Goal shooting. The subject could start from any position on the floor, and at the starting signal shoots as many baskets as possible in one minute, retrieving the ball each time himself. The score was the number of baskets made in one minute.

Wall passing. The subject stood behind a line six feet from a wall and passed the ball against the wall as many times as possible in one minute. It was considered a miss to bat the ball instead of catch it or step over the restraining line. The score was the number of passes made in one minute.

Dribbling. The subject was required to dribble alternately to the left and right of bottles placed in a line 15-feet apart for a 90 foot distance, circle the end bottle, and continue on in this manner for one minute. A miss was counted if a bottle were passed on the wrong side or if a bottle were knocked over. The score was the number of bottles passed in one minute.

Russell-Lange Volleyball Test

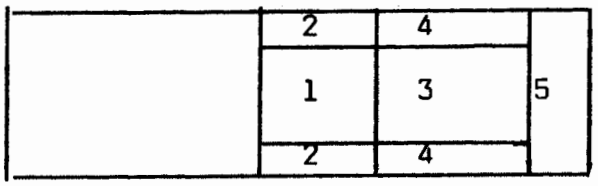
The Russell-Lange Volleyball Test was designed to provide a means to measure volleyball playing ability.

The test is basically a girls' test, but with an allowance made for the differences in the height of the net, it may be used for boys. Reliability = r = .90, Validity = r = .67 (24;33). The equipment necessary for administering this test included six volleyballs; one stop watch; one volleyball net. The test items are:

Volleying test. Special court markings are as follows: (1) A line 10 feet long marked on the wall at net height, 8 feet from the floor, and (2) A line 10 feet long on the floor opposite the wall and 3 feet from the wall. The player being tested stood behind the 3 foot line, and with an underhand movement volleyed the ball repeatedly against the wall, above the net line, for 30 seconds. If the ball got out of control it had to be retrieved by the subject and started over again as at the beginning. The score was the number of times the ball was clearly batted (not tossed) against the wall. The best score of three trials was recorded.

Serving test. Special court markings were needed for the serving test. They were: (1) Chalk line across court five feet inside and parallel to end line; (2) Chalk line across court parallel to and

12½ feet from the line under the net; and (3) Chalk lines five feet inside and parallel to each side line, extending from line under net to line 1. Example, Diagram I:



The subject serves ten times in a legal manner into a target on the court across the net. Each serve is scored according to the value of the target area in which the ball lands. A ball that landed on a line separating two areas was given the higher value. Two trials were given and the score was the sum of ten area scores with the best of two trials being recorded.

Track and Field Tests

To test track and field, the investigator chose three running events and two field events. The equipment necessary for administering these tests included one eight pound shot put; eight hurdles; two stop watches; one fifty foot measuring tape. The following tests were used to measure performance in track and field.

Shot put. The eight-pound shot was used in this test. The subject could use any legal form, and the best of three trials was recorded. The score was the distance, in feet and inches, thrown.

Running broad jump. All rules for broad jumping were followed. The subject was allowed three jumps with the best jump being recorded. If his foot was over the board (scratch) this counted as a jump. The score was the distance, in feet and inches, jumped.

220 yard run. The subject stood behind the starting line and on a given signal ran 220 yards as fast as possible. The score was the time in seconds to the nearest tenth.

60 yard hurdles. Four hurdles were used in this test. The hurdles were 10 yards apart with 15 yards between the starting line and the first hurdle, and between the last hurdle and the finish line. The subject stood behind the starting line and on a given signal ran the 60 yards, jumping the four hurdles. The score was the time in seconds to the nearest tenth.

100 yard dash. The subject stood behind the starting line and on a given signal ran the 100 yards

as fast as possible. The score was the time in seconds to the nearest tenth.

III. ORGANIZATION OF THE TEST SITUATION

In order to administer the tests with ease and efficiency the following procedure was followed:

Student Orientation. The investigator used the same student orientation for all five of the measuring devises used in this tudy. A general orientation was given before each test which included the following information:

1. The purpose of the test
2. What the test measure
3. The exact procedure for performance on each test item
4. A demonstration of each test item
5. The need for all out performance

IV. COLLECTION OF THE DATA

Washington State Physical Fitness Test

The Washington State Physical Fitness Test was given at the beginning and the end of the school year. The first test was given on September 13, 14, 1965, after the grouping of the students was completed.

The final test was given on June 1 and 2, 1966.

The first step in the collection of data was to calculate the McCloy's Classification Index for each student.

C. I. = 20 (age in years) ∕ 6 (height in inches) ∕ weight (pounds)

This total was then compared to the following table to determine the subject's class:

Class	Score
A	up to 674
B	675-709
C	710-744
D	745-779
E	780-814
F	815-849
G	850-884
H	885-up

Scores were recorded by the investigator with the help of student assistants. These scores were later changed, by using the proper score sheet, from raw scores to points, total points and to a physical fitness rating. The ratings used in this test were superior, good, average, poor, and very poor. See Appendix,

Table XVII, for example of a score sheet.

Borleske Touch-Football Test

The Borleske Touch-Football Test was given at the beginning of the touch-football unit and also at the end of this unit. The unit was five weeks long.

Scores were recorded by the investigator with the help of student assistants. These scores were then changed from raw scores to T scores (appendix, Table XVIII) and combined to give each individual a total touch football score.

Stroup Basketball Test

The Stroup Basketball Test was given at the beginning of the basketball unit and also at the end of the unit. The unit was six weeks long.

Scores were recorded by the investigator with the help of student assistants. These scores were later changed from raw scores to scale scores (Appendix, Table XIX) and combined to give each individual a total basketball score.

Russell-Lange Volleyball Test

The Russell-Lange Volleyball Test was given at the beginning of the volleyball unit and also at the

of the unit. The unit was five weeks long.

Scores were recorded by the investigator with the help of student assistants. These scores were later changed from raw scores to sigma scale scores (Appendix, Table XX) and combined to give each individual a total volleyball score.

Track and Field Tests

The track and field tests were given at the beginning of the track and field unit and also at the end of this unit. The unit was seven weeks long.

Scores were recorded by the investigator with the help of student assistants. These scores were later changed from raw scores to point scores using Charles h. McCloy's Universal Scoring Tables (Appendix, Table XXI). These point scores were then combined to give each individual a total track and field score.

CHAPTER IV

RESULTS AND ANALYSIS OF THE DATA

Analysis of the data will be discussed in five areas: (1) Physical Fitness, (2) Touch-Football, (3) Volleyball, (4) Basketball and (5) Track and Field.

I. PHYSICAL FITNESS

Results of Pre-Test

The Washington State Secondary School Physical Fitness Test was administered to the three groups at the beginning of the year with the following results: The high ability group had a mean of 209.03 with a standard deviation of 20.66; the low ability group had a mean of 190.03 and a standard deviation of 30.50; the control group, containing students of all ranges of motor ability, had a mean of 201. 43 and a standard deviation of 25.56. It was determined that the standard error of the mean of the high group was 3.71, of the low group 5.47, and of the control group 4.75.

TABLE I

MEAN SCORES FOR PRE-TEST
PHYSICAL FITNESS

Group	Mean	Standard Deviation	Standard error of the mean
High	209.03	20.66	3.71
Low	190.03	30.50	5.47
Control	201.43	25.56	4.75

Results of Post-Test

The Washington State Secondary School Physical Fitness Test was administered to the same three groups at the end of the school year with the following results: The high group had a mean of 228.75 with a standard deviation of 15.86; the low group had a mean of 207.66 with a standard deviation of 28.25; the control group had a mean of 222.50 with a standard deviation of 19.34. It was determined that the standard error of the mean of the high group was 2.85, of the low group 5.07, and of the control group 3.59.

TABLE II

MEAN SCORES FOR POST-TEST
PHYSICAL FITNESS

Group	Mean	Mean Increase	Standard Deviation	Standard error of the mean
High	228.75	19.72	15.86	2.85
Low	207.66	17.63	28.25	5.07
Control	222.50	21.07	19.34	3.59

Comparison of Pre-Test and Post-Test

Tables I and II show that there was an increase of mean by each of the three groups in the second or post-test. The high group had a pre-test mean of 209.03 and a post-test mean of 228.75, which shows an increase of 19.72. The low group had a pre-test mean of 190.03 and a post-test mean of 207.66 which shows an increase of 17.63. The control group had a pre-test mean of 201.43 and a post-test mean of 222.50 which shows an increase of 21.07. Thus, the control group's mean increased 1.35 more than the high group and 3.44 more than the low group.

In order to determine whether there was significant difference between the results of the first

test and second test, an analysis of the difference between means was applied to the data. The results of this analysis appear in Table III.

The standard error of the difference between means in the first and second tests of the high group was 4.67; this resulted in a "t" of 4.22, which was well above the necessary 2.39 for a .01 level of confidence.

The standard error of the difference between means of the low group was 7.45; this resulted in a "t" of 2.37 which is significant at the .05 level of confidence, but does not quite reach the 2.39 required to be .01 level of confidence.

The standard error of the difference between means of the control group was 5.95. The "t" was 3.55--well above the necessary 2.40 for a .01 level of confidence.

TABLE III

COMPARISON OF PRE AND POST TESTS
PHYSICAL FITNESS

Group	Standard error of the difference	"t"	Level of Significance
High	4.67	4.22	.01
Low	7.45	2.37	.05
Control	5.95	3.55	.01

II. TOUCH FOOTBALL

Results of Pre-Test

The Borleske Touch Football Test was administered to the three groups at the beginning of the touch football unit, with the following results: The high ability group had a mean of 116.00 with a standard deviation of 12.99; the low ability group had a mean of 109.09 and a standard deviation of 14.75; the control group had a mean of 105.23 and a standard deviation of 17.93. It was determined that the standard error of the mean of the high group was 2.33, of the low group 2.65, and of the control group 3.33.

TABLE IV

MEAN SCORES FOR PRE-TEST
TOUCH FOOTBALL

Group	Mean	Standard Deviation	Standard error of the mean
High	116.00	12.99	2.33
Low	109.09	14.75	2.65
Control	105.23	17.93	3.33

Results of Post-test

The Borleske Touch Football Test was administered to the same three groups at the end of the five week unit with the following results: The high group had a mean of 117.55 with a standard deviation of 13.90; the low group had a mean of 109.28 with a standard deviation of 14.69; and the control group had a mean of 105.95 with a standard deviation of 14.09. It was determined that the standard error of the mean of the high group was 2.49, of the low group 2.64, and of the control group 2.62.

TABLE V

MEAN SCORES FOR POST-TEST
TOUCH FOOTBALL

Group	Mean	Mean Increase	Standard Deviation	Standard of error of the mean
High	117.55	1.55	13.90	2.49
Low	109.28	.19	14.69	2.64
Control	105.95	.72	14.09	2.62

Comparison of Pre-Test and Post-Test

Tables IV and V show that there was a very slight increase of mean by each of the three groups in the second or post-test. The high group had a pre-test mean of 116.00 and a post-test mean of 117.55 which shows an increase of 1.55. The low group had a pre-test mean of 109.09 and a post-test mean of 109.28 which shows an increase of .19. The control group had a pre-test mean of 105.23 and a post-test mean of 105.95 which shows an increase of .72. Thus, the high group's mean increased 1.36 more than the low group and .83 more than the control group.

In order to determine whether there was

significant difference between the results of the first test and second test, an analysis of the differences between means was applied to the data. The results of this analysis appear in Table VI.

The standard error of the difference between means in the first and second tests of the high group was 3.41; this resulted in a "t" of .45 which is well below the 1.67 needed to have a .05 level of confidence.

The standard error of the difference between means of the low group was 3.74; this resulted in a "t" of .05 which is not significant.

The standard error of the difference between means of the control group was 4.22. The "t" was .17 which is not significant.

TABLE VI

COMPARISON OF PRE AND POST TESTS
TOUCH FOOTBALL

Group	Stand. error of the difference	"t"	Level of significance
High	3.41	.45	N.S.
Low	3.74	.05	N.S.
Control	4.22	.17	N.S.

III. VOLLEYBALL

Results of Pre-Test

The Russell-Lange Volleyball Test was administered to the three groups at the beginning of the volleyball unit with the following results: The high ability group had a mean of 133.47 with a standard deviation of 17.17; the low ability group had a mean of 126.03 with a standard deviation of 25.28; the control group had a mean of 114.20 with a standard deviation of 28.52. It was determined that the standard error of the mean of the high group was 3.09, of the low group 4.54, and of the control group 5.30.

TABLE VII

MEAN SCORES FOR PRE-TEST
VOLLEYBALL

Group	Mean	Standard Deviation	Standard error of the mean
High	133.47	17.17	3.09
Low	126.03	25.28	4.54
Control	114.20	28.52	5.30

Results of Post-Test

The Russell Lange Volleyball test was administered to the same three groups at the end of the five weeks unit with the following results: The high group had a mean of 142.78 with a standard deviation of 21.52; the low group had a mean of 137.66 with a standard deviation of 23.39; the control group had a mean of 121.87 with a standard deviation of 27.70. It was determined that the standard error of the mean of the high group was 3.88, of the low group 4.20 and of the control group 5.15.

TABLE VIII

MEAN SCORES FOR POST-TEST
VOLLEYBALL

Group	Mean	Mean Increase	Standard Deviation	Standard error of the mean
High	142.78	9.31	21.52	3.86
Low	137.66	11.63	23.39	4.20
Control	121.87	7.67	27.70	5.15

Comparison of Pre-Test and Post-Test

Tables VII and VIII show that there was an increase of mean by each of the three groups in the second or post-test. The high group had a pre-test mean of 133.47 and a post-test mean of 142.78, which shows an increase of 9.31. The low group had a pre-test mean of 126.03 and a post-test mean of 137.66, which shows an increase of 11.63. The control group had a pre-test mean of 114.20 and a post-test mean of 121.87 which shows an increase of 7.67. Thus, the low group's mean increased 2.32 more than the high group and 3.96 more than the control group.

In order to determine whether there was significant difference between the results of the first test and the second test, an analysis of the difference between means was applied to the data. The results of this analysis appear in Table IX.

The standard error of the difference between means in the first and second tests of the high group was 4.94; this resulted in a "t" of 1.88 which is significant at the .05 level of confidence.

The standard error of the difference between means of the low group was 6.18; this resulted in a "t" of 1.88 which is significant at the .05 level of confidence.

The standard error of the difference between means of the control group was 7.38. The "t" was 1.04 which is not significant.

TABLE IX

COMPARISON OF PRE AND POST TESTS
VOLLEYBALL

Group	Standard error of the difference	"t"	Level of Significance
High	4.94	1.88	.05
Low	6.18	1.88	.05
Control	7.38	1.04	N.S.

IV. BASKETBALL

Results of Pre-Test

The Stroup Basketball Test was administered to the three groups at the beginning of the basketball unit with the following resutls: The high ability group had a mean of 183.56 with a standard deviation of 17.92; the low ability group had a mean of 181.03 with a standard deviation of 20.90; the control group had a mean of 170.00 with a standard deviation of 18.97. It was determined that the standard error of the mean of the high group was 3.21, of the low group 3.75, and of the control group 3.53.

TABLE X

MEAN SCORES FOR PRE-TEST
BASKETBALL

Group	Mean	Standard Deviation	Standard error of the mean
High	183.56	17.92	3.21
Low	181.03	20.90	3.75
Control	170.00	18.97	3.53

Results of Post-Test

The Stroup Basketball test was administered to the same three groups at the end of the six week unit with the following results: The high group had a mean of 195.41 with a standard deviation of 19.07; the low group had a mean of 187.87 with a standard deviation of 19.96; the control group had a mean of 176.47 with a standard deviation of 23.19. It was determined that the standard error of the mean of the high group was 3.42, of the low group, 3.58 and of the control group, 4.31.

TABLE XI

MEAN SCORES FOR POST-TEST BASKETBALL

Group	Mean	Mean Increase	Standard Deviation	Standard error of the mean
High	195.41	11.85	19.07	3.42
Low	187.87	6.84	19.96	3.58
Control	176.47	6.47	23.19	4.31

Comparison of Pre-Test and Post-Test

Tables X and XI show that there was an increase of mean by each of the three groups in the second or post-test. The high group had a pre-test mean of 183.56 and a post-test mean of 195.41; which shows an increase of 11.85. The low group had a pre-test mean of 181.03 and a post-test mean of 187.87, which shows an increase of 6.84. The control group had a pre-test mean of 170.00 and a post-test mean of 176.47, which shows an increase of 6.47. Thus, the high group's mean increased 5.01 more than the low group and 5.38 more than the control group.

In order to determine whether there was significant difference between the results of the first test and second test, an analysis of the difference between the results of the first test and second test, an analysis of the difference between means was applied to the data. The results of this analysis appear in Table XIII.

The standard error of the difference between means in the first and second tests of the high group was 4.69; this resulted in a "t" of 2.53 which is significant at the .01 level of confidence.

The standard error of the difference between means of the low group was 5.18; this resulted in a "t" of 1.32 which is not significant.

The standard error of the difference between means of the control group was 5.57. The "t" was 1.16 which is not significant.

TABLE XII

COMPARISON OF PRE AND POST TESTS
BASKETBALL

Group	Standard error of the difference	"t"	Level of Significance
High	4.69	2.53	.01
Low	5.18	1.32	N.S.
Control	5.57	1.16	N.S.

V. TRACK AND FIELD

Results of Pre-Test

The track and field tests were administered to the three groups at the beginning of the year with the following results: The high ability group had a mean of 1290.84 with a standard deviation of 192.23;

the low ability group had a mean of 1092.75 with a standard deviation of 236.60; the control group had a mean of 1113.27 with a standard deviation of 244.39. It was determined that the standard error of the mean of the high group was 34.51, of the low group 42.48, and of the control group 45.43.

TABLE XIII

MEAN SCORES FOR PRE-TEST
TRACK AND FIELD

Group	Mean	Standard Deviation	Standard error of the mean
High	1290.84	192.23	34.51
Low	1092.75	236.60	42.48
Control	1113.27	244.39	45.53

Results of Post-Test

The track and field tests were administered to the same three groups at the end of the seven weeks track and field unit with the following results: The high group had a mean of 1373.69 with a standard deviation of 258.43; the low group had a mean of 1156.22 with a standard deviation of 280.82; the

control group had a mean of 1154.43 with a standard deviation of 283.19. It was determined that the standard error of the mean of the high group was 46.40, of the low group 50.42, and of the control group 42.64.

TABLE XIV

MEAN SCORES FOR POST-TEST
TRACK AND FIELD

Group	Mean	Mean Increase	Standard Deviation	Standard error of the mean
High	1373.69	82.85	258.43	46.40
Low	1156.22	63.47	280.82	50.42
Control	1154.43	41.16	283.19	52.64

Comparison of Pre-Test and Post-Test

Tables XIII and XIV show that there was an increase of mean by each of the three groups in the second or post-test. The high group had a pre-test mean of 1290.84 and a post-test mean of 1373.69, which shows an increase of 82.85. The low group had a pre-test mean of 1092.75 and a post-test mean of 1156.22, which shows an increase of 63.47. The control group

had a pre-test mean of 1113.27 and a post-test mean of 1154, which shows an increase of 41.16. Thus, the high group's mean increased 19.38 more than the low group and 41.69 more than the control group.

In order to determine whether there was a significant difference between the results of the first test and second test, and analysis of the difference between means was applied to the data. The results of this analysis appear in Table XV.

The standard error of the difference between means in the first and second tests of the high group was 57.82; this resulted in a "t" of 1.43 which is not significant.

The standard error of the difference between means of the low group was 50.42; this resulted in a "t" of .96 which is not significant.

The standard error of the difference between means of the control group was 69.68. The "t" was .59, well below the 1.67 needed to be at the .05 level of confidence.

TABLE XV

COMPARISON OF PRE AND POST TESTS
TRACK AND FIELD

Group	Standard error of the difference	"t"	Level of Significance
High	57.82	1.43	N.S.
Low	65.92	.96	N.S.
Control	69.68	.59	N.S

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

I. SUMMARY

The purpose of this study was to evaluate the effects of motor ability grouping in physical education on the improvement of physical fitness and certain game skills.

The study was conducted at Baker Junior High School, Tacoma, Washington, and involved two classes of eighth grade boys and one class of ninth grade boys. The subjects were grouped into three different groups. Two of the groups, high and low ability, were grouped by McCloy's Motor Ability Test. The third group was the control group which was a typical physical education class containing students of all ranges of ability.

Pre and post tests were administered in the five areas tested, and the mean, standard deviation, standard error of the mean, standard error of the difference and "t" scores were computed for each test.

Physical Fitness

In comparing the pre-test and post-test means, the control group showed the greatest amount of improvement of the three groups. The high group had the second greatest improvement, and the low group recorded the least improvement.

Touch Football

In comparing the pre-test and post-test means, the high group showed the greatest amount of improvement of the three groups. The control group had the second greatest improvement, and the low group recorded the least improvement.

Volleyball

In comparing the pre-test and post-test means, the low group showed the greatest amount of improvement of the three groups. The high group had the second greatest improvement, and the control group recorded the least improvement.

Basketball and Track and Field

In comparing the pre-test and the post-test means, the high group showed the greatest amount of improvement of the three groups in both basketball and

track and filed. The low group had the second greatest improvement in both, and the control group recorded the least improvement.

II. CONCLUSIONS

Conclusions based upon the analysis of the data are as follows:

Physical Fitness

The statistical data indicated a definite increase in physical fitness for all three groups, with the high and control groups being at the .01 level of confidence and the low group recording a .05 level of confidence. As stated earlier, the control group had the highest mean increase between the pre and post tests. Since the control group improved more than the high and low groups it does not seem that ability grouping affected the rate of improvement in physical fitness.

Touch Football

The statistical data indicated a very slight increase in touch football skills. The "t" scores for all three groups were not significant. The mean difference between the pre and post means showed that

the high ability group improved the most, but the control group showed more improvement than the low ability group.

Volleyball

The statistical data indicated an increase in volleyball skills for all three groups, but the control group's increase was not significant. Table VIII shows that the low group improved more than the other two groups, and the high group improved more than the control group. If ability grouping had no effect the low group should be as far below the control group as the high group is above the control group. Since this is not the case, it can be seen that ability grouping was beneficial in volleyball.

Basketball

The statistical data indicated an increase in basketball skills for all three groups. The high group's "t" was significant at the .01 level of confidence. The low and control group's "t" was not significant. Table XI shows that the high group definitely improved more than the other two groups, and the low group had as much improvement as the control group. If ability grouping had no effect the low

group should be as far below the control group as the high group is above the control group. Since this is not the case it can be seen that ability grouping was beneficial in basketball. This may not be shown statistically, but the trend is nevertheless present.

Track and Field

The statistical data indicated an increase in track and field skills for all three groups, but the "t" scores were not significant. Table XIV shows that the high ability group improved more than the other two groups, and the low group improved more than the control group. If ability grouping had no effect the low group should be as far below the control group as the high group is above the control group. Since this is not the case, it can be seen that ability grouping was beneficial in track and field. This may not be shown statistically, but the trend is nevertheless present.

This study has shown that the high ability group's improvement rate was larger than that of the control group in four out of five tests, and the low group's improvement rate was larger than that of the control group in three out of five tests. The fact

that the increases of all groups were significant in only six out of the fifteen tests makes the importance of the above data questionable.

There are no statistics to show social adjustment, but the investigator felt that the two ability grouped classes were easier to teach, had fewer discipline problems, and seemed to enjoy physical education to a greater extent than did the non-grouped control class.

The investigator feels that ability grouping in physical education is worthwhile, and he will continue to organize his classes in this manner.

III. RECOMMENDATIONS

On the basis of this study, the writer suggests the following recommendations:

A more accurate measurement of motor ability is necessary. The McCloy Motor Ability Test seems to stress age and body size more than motor ability.

Further studies could be carried on for more than one year to assure better and more conclusive results.

Similar types of studies should be conducted in physical education, testing other areas--such as, social adjustment.

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APPENDIX

TABLE XVI

McCLOY'S UNIVERSAL SCORING TABLES

Universal Scoring Table Points		50 Yard Dash	Standing Broad Jump	Running High Jump	Softball Throw
1.	90	10.4	4-4	2-8	
2.	93	10.3	4-5		108
3.	97	10.2	4-6		110
4.	101	10.1	4-7	2-9	113
5.	105	10.0	4-7½		116
6.	109	9.9	4-8	2-10	118
7.	113	9.8	4-9		121
8.	117	9.7	4-10	2-11	124
9.	122	9.6	4-10½		126
10.	126	9.5	4-11	3-0	128
11.	131	9.4	5-0		131
12.	137	9.3	5-1	3-1	133
13.	142	9.2	5-2		136
14.	147	9.1	5-3	3-2	140
15.	153	9.0	5-4		143
16.	159	8.9	5-5	3-3	145
17.	165	8.8	5-6		148
18.	172	8.7	5-7	3-4	152
19.	179	8.6	5-8	3-5	156
20.	186	8.5	5-9		160
21.	194	8.4	5-10	3-6	164
22.	202	8.3	6-0	3-7	168
23.	210	8.2	6-1		172
24.	219	8.1	6-2	3-8	176
25.	228	8.0	6-3	3-9	180
26.	238	7.9	6-5	3-10	184
27.	248	7.8	6-6		188
28.	259	7.7	6-7	3-11	196
29.	271	7.6	6-9	4-0	200
30.	283	7.5	6-10	4-1	204
31.	295	7.4	7-0	4-2	212
32.	309	7.3	7-2	4-3	216
33.	338	7.2	7-3	4-4	224
34.	338	7.1	7-5	4-5	228
35.	354	7.0	7-7	4-6	236

TABLE XVI (continued)

Universal Scoring Table Points	50 Yard Dash	Standing Broad Jump	Running High Jump	Softball Throw
36. 371	6.9	7-9	4-7	244
37. 389	6.8	7-11	4-8	252
38. 407	6.7	8-0	4-9	256
39. 427	6.6	8-2	4-10	264
40. 449	6.5	8-5	4-11	276
41. 471	6.4	8-7	5-1	284
42. 495	6.3	8-9	5-2	292
43. 521	6.2	8-11	5-3	300

TABLE XVII

WASHINGTON STATE PHYSICAL FITNESS TEST BATTERY

CLASSIFICATION A

NAME _____ _____ SCHOOL

(Junior-Senior High School Boys)

STRENGTH							AGILITY		ENDURANCE					FLEXIBILITY	TOTAL Physical Fitness
Chins		Dips		Jump Reach		Total Strength	10-Seconds Squat Thrust		1-Minute Squat Thrust		Drop-off		Total Endurance	Floor Touch Touch Right Touch Left	
Score	Pts.	Score	Pts.	Score	Pts.		Score	Pts.	Score	Pts.	Score	Pts.			
									44	41					
				22	29		8½	82	43½-43¾	40					
16	27	20	27	20½-21½	27		8¼	80	42½-43¼	39					
15	26	18-19	26	20	26		8	75	41¼-42¼	38					
14	25	16-17	25	19 -19½	25	67-up	7¾	72	39 -41	37	0	32	65-up		242-up
13	24	14-15	24	18 -18½	24		7½	70	38¼-38¾	36					
12	23	11-13	23	17 -17½	23		7¼	68	37¼-38	35					
11	22			16 -16½	22		7	65	36 -37	34					
									35¼-35¾	33					
				15½	21				33¾-35	32					
		10	20	14½-15	20		6¾	63	32½-33½	31	¼- ½	30			
8-10	19	7- 9	19	14	19	54-66	6½	62	31 -32¼	30	¾- 1¼	29	53-64		208-241
7	18	5- 6	18				6¼	60	30 -30¾	29	1½- 2¼	28			
							6	57	29 -29¾	28	2½- 3¼	27			
									27¾-28¾	27	3½- 4	26			
							5¾	55							
							5½	53	26¾-27½	26				Pass Three	
				13 -13½	18		5¼	51	26 -26½	25	4¼- 4¾	25		Tests	
4- 6	17	3- 4	17	12½	17	48-53	5	49	25 -25¾	24	5 - 5¾	24	44-52	45 Points	171-207
3	16			12	16		4¾	47	24 -24¾	23	6 - 6¾	23			
				11½	15		4½	45	23 -23¾	22	7 - 7¾	22			
		2	16				4¼	43	21¾-22¾	21	8 - 8¾	21			
2	15						4	41	20½-21½	20	9 -10¼	20		Pass Two	
		1	14	10½-11	14	37-47	3¾	38	19½-20	19	10½-11½	19	33-43	Tests	133-170
1	13			10	13		3½	36	17½-19	18	11¾-12¼	18		30 Points	
				9½	12		3¼	35	15¾-17¼	17	12½-14	17			
				9	10		3	33							
				8½	8		2¾	31	12½-15½	16	14½-16	16			
				8	7		2½	30	11½-12½	15	16½-16¾	15		Pass One	
				6 - 7½	4	36-down	2¼	29	8½-11	14	17 -17½	13	32-down	Test	132-down
							2	19	6½- 8¼	13	17½-17¾	10		15 Points,	
0	0	0	0				1¾	10	5½- 6¼	12	18 -19½	6		0 Test,	
									5 - 5¼	5	19½	5		0 Points	

DIRECTIONS

1. To compute the Drop-off score multiply the score for the 10-Sec. Squat Thrusts by 6, Subtract the number of Squat Thrusts the subject actually performed in the 1-Min. Squat Thrust test from the above figure.

DIRECTIONS FOR SCORING:

2. Record test score for each item in the test in the Column marked "Score" at the bottom of card.

3. Find the point score corresponding to each test score and record in Column marked "Pts." (Points)

4. Sum up the point scores for Chins, Dips and Jump Reach and record in "Total Strength" Column.

5. Sum up the point scores for the 1-Min. Squat Thrust and Drop-off and record in "Total Endurance".

6. Record the points for flexibility as indicated in Flexibility Column and record in space for Flexibility.

7. Sum up point scores for total Strength, Agility, Total Endurance, and Flexibility and record in "Total Physical Fitness" Column.

8. Check your rating for each item and for total physical fitness by finding the rating on the chart that corresponds to your point rating for that particular item.

9. At the end of year, repeat the process for the second measurement. Find the difference in points between your score on the first test and your score on the second test and record this in the appropriate column opposite improvement. This is your improvement in the period of time that has elapsed between your first and second test.

	Date of Test
First Test	
Second Test	

TABLE XVIII

T-SCORES FOR THE BORLESKE TOUCH FOOTBALL TEST

FORWARD PASS FOR DISTANCE - SCORE IN YARDS	T-SCORE	RUNNING STRAIGHT-AWAY - MEASURED TO NEAREST TENTH SECOND	T-SCORE	PUNT FOR DISTANCE - NEAREST YARD	T-SCORE
56-58	75	5.36-5.55	72.5	50.6-53.5	75
53-55	73	5.56-5.75	65.	47.6-50.5	71
50-52	69	5.76-5.95	60.5	44.6-47.5	69
47-49	66	5.96-6.15	56.	41.6-44.5	62
44-46	63	6.16-6.35	51.5	38.6-41.5	56
41-43	59	6.36-6.55	48.	35.6-38.5	51
38-40	54	6.56-6.75	44.	32.6-35.5	48
35-37	50	6.76-6.95	40.5	29.6-32.5	45
32-34	46	6.96-7.15	37.5	26.6-29.5	40
29-31	42	7.16-7.35	35.	23.6-26.5	38
26-28	39	7.36-7.55	31.5	20.6-23.5	37
23-25	36	7.56-7.75	27.5	17.6-20.5	35
20-22	34	7.76-7.95	27.5	14.6-17.5	30
17-19	31	7.96-8.15	27.5	11.6-14.5	27
14-16	27	8.16-8.35	27.5	8.6-11.5	25
11-13	25	8.36-8.55	27.5		
		8.56-8.75	27.5		
		8.76-8.95	27.5		
		8.96-9.15	00.0		

TABLE XIX

SCALE SCORES FOR STROUP BASKETBALL TEST

Shooting	Passing	Dribbling	Scale Score	Shooting	Passing	Dribling	Scale Score
6	53	27	51	24	78	42	76
7	55		52				77
8	56	28	53	25	79	43	78
9	57	29	54	26	80		79
	59	30	55	27	81	44	80
10	60	31	56		82		81
11	61		57	28		45	82
12	62	32	58	29	83		83
13	64	33	59		84	46	84
14	65	34	60	30	85		85
	66		61		86	47	86
15		35	62	31	87		87
16	67		63	32	88	48	88
	68	36	64		89	49	89
17	69		65	33	90	50	90
	70	37	66	34	91		91
18			67	35	93	51	92
19	71	38	68	36	94		93
	72		69	37	95	52	94
20	73	39	70		97		95
21			71	38	98	53	96
	74	40	72	39	99		97
22	75		73	40	100	54	98
23	76	41	74	41	102	55	99
	77		75	42	103	56	100

TABLE XX

NORMS ON RUSSELL-LANGE VOLLEYBALL TEST

Scale Score	Repeated Volley	Serve	Scale Score
100	51	45	100
95	48	42	95
90	45	39	90
85	42	36	85
80	39	34	80
75	36	31	75
70	33	28	70
65	30	25	65
60	27	22	60
55	24	19	55
50	22	16	50
45	19	15	45
40	17	13	40
35	15	11	35
30	13	10	30
25	11	8	25
20	8	6	20
15	6	5	15
10	4	3	10
5	2	1	5

TABLE XXI

McCLOY'S UNIVERSAL SCORING TABLES

Universal Scoring Table Points		220 Yard Run	60 Yard Low Hurdles	100 Yard Dash	Running Broad Jump	8 Pound Shot-put
1.	90	41.0	15.0	18.8	7-4	17-0
2.	93	40.7	14.8	18.6	7-6	17-4
3.	97	40.3	14.6	18.4	7-8	17-8
4.	101	39.8	14.4	18.2	7-10	18-0
5.	105	39.4	14.2	18.1	8-0	18-4
6.	109	39.0	14.0	17.9	8-2	18-8
7.	113	38.7	13.9	17.7	8-4	19-0
8.	117	38.3	13.7	17.5		19-4
9.	122	37.9	13.6	17.3	8-6	20-0
10.	126	37.5	13.5	17.2	8-8	20-4
11.	131	37.1	13.3	17.0	8-10	20-8
12.	137	36.7	13.1	16.8	9-2	21-4
13.	124	36.3	12.9	16.6	9-4	21-8
14.	147	35.9	12.8	16.5	9-6	22-4
15.	153	35.5	12.6	16.3	9-8	22-8
16.	159	35.1	12.5	16.1	9-10	23-4
17.	165	34.7	12.3	15.9	10-0	23-8
18.	172	34.3	12.1	15.7	10-2	24-4
19.	179	34.0	12.0	15.5	10-6	25-0
20.	186	33.6	11.8	15.4	10-8	25-4
21.	194	33.2	11.7	15.2	11-0	26-0
22.	202	32.8	11.5	15.0	11-2	26-8
23.	210	32.4	11.3	14.8	11-4	27-4
24.	219	32.0	11.2	14.6	11-8	28-0
25.	228	31.6	11.0	14.5	12-0	28-8
26.	238	31.2	10.9	14.3	12-2	29-4
27.	248	30.8	10.7	14.1	12-6	30-0
28.	259	30.4	10.6	13.9	12-10	31-0
29.	271	30.0	10.4	13.7	13-2	31-8
30.	283	29.6	10.2	13.6	13-4	32-8
31.	295	29.2	10.1	13.4	13-8	33-8
32.	309	28.8	9.9	13.2	14-0	34-4
33.	323	28.4	9.8	13.0	14-6	35-4
34.	338	28.0	9.6	12.8	14-10	36-4
35.	354	27.6	9.4	12.7	15-2	37-8

TABLE XXI (continued)

Universal Scoring Table Points	220 Yard Run	60 Yard Low Hurdles	100 Yard Dash	Running Broad Jump	8 Pound Shot-put
36. 371	27.2	9.3	12.5	15-8	38-8
37. 389	26.8	9.1	12.3	16-0	39-8
38. 407	26.4	9.0	12.1	16-6	41-0
39. 427	26.0	8.8	11.9	16-10	42-0
40. 449	25.6	8.7	11.7	17-4	43-8
41. 471	25.2	8.5	11.6	17-10	45-0
42. 495	24.8	8.4	11.4	18-4	46-4
43. 521	24.4	8.2	11.2	18-10	48-0
44. 548	24.1	8.1	11.0	19.6	49-4
45. 577	23.7	7.9	10.8	20-0	51-0